Home Automation System with Keypad Interface (H.A.S.K.I)

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1 About the H.A.S.K.I

1.1 Description

- This project is an Home Automation System with Keypad Interface (H.A.S.K.I). This system helps to control Light, Fans and Doors of our house. There is a keypad present which enables a feature on pressing each number. For example if we press 1 then it opens our maindoor and if we press 2 it closes our main door.There are several features such as fixing a password to our system and even temperature is displayed on our LCD.

1.2 Identifying features

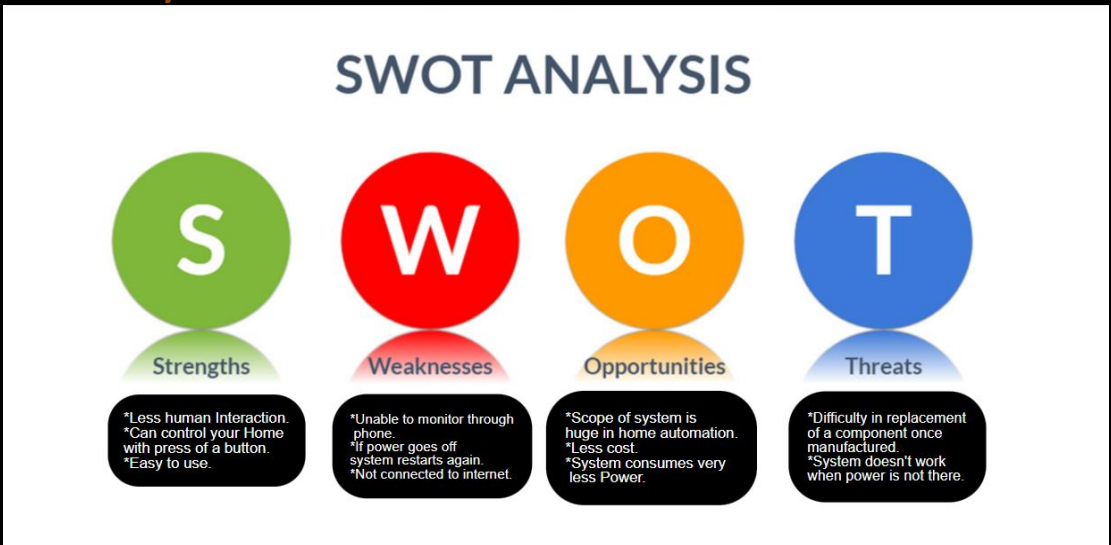
- Keypad shall be provided to ease the access of available features.
- Automatic door opening and closing shall be provided along with automatic stop switches to stop once opened completely.
- LCD Display shall be provided to know the option we press.
- Room Temperature shall be displayed on LCD.
- Number of Fans and lights on or off shall be displayed on LCD.
- Security lock is provided to unlock the system.

1.3 State of art

- The main focus of this project is to control Doors,Fans and Lights through a remote. A security code shall be fixed which ensures security to our house even when remote is misplaced. A LCD screen can be seen which displays the option we enter and also the present status of number of Lights and Fans on or off can be seen. By combining all these features a final product is made known as H.A.S.K.I. As the technology is increasing rapidly these kind of automations are very useful in our daily lives.

1.4 5W's 1H

Swot Analysis



2 Requirements

2.1 High Level Requirements

ID	High Level Requirements
HLR1	System shall control Fan,Light,Doors by pressing a number on Keypad
HLR2	There shall be a LCD to display the numbers we press
HLR3	A password shall be provided for our system
HLR4	System shall detect temperaure

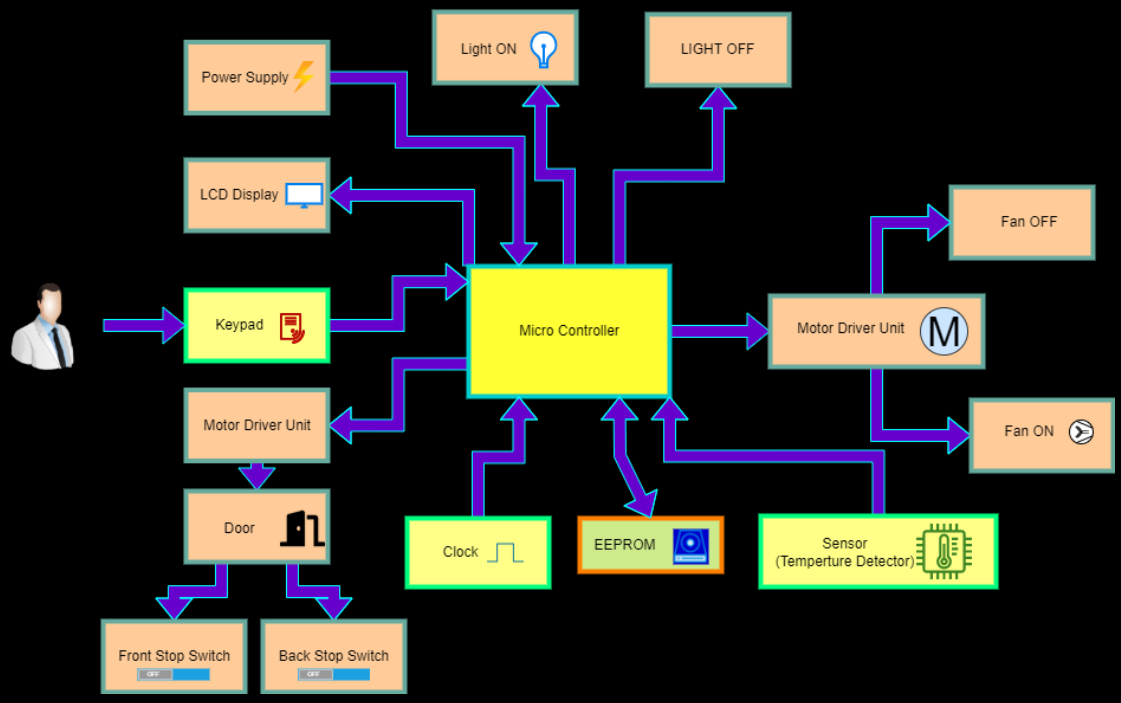
2.2 Low Level Requirements

ID	Low Level Requirements for HL1		ID	Low Level Requirements for HL2
LLR1.1	According to the values of **Keypad** Fan,Light shall be controlled		LLR2.1	Entered value on keypad shall be displayed on **LCD** Screen
LLR1.2	According to the values of **Kaypad** opening,closing of doors shall be controlled		LLR2.2	Number of Lights and Fans On **LCD** Screen
ID	Low Level Requirements for HL3		ID	Low Level Requirements for HL4
LLR3.1	Device shall open when the **Password** is matched		LLR4.1	**Temperature Sensor** shall detect the room temperature

LLR3.2	Device shall ask to Re-Enter the **Password** again if entered one is wrong		LLR4.2	The temperature detected by **Temperature Sensor** shall be printed on LCD Screen

3 Block Diagram and Blocks explination

3.1 BLOCK DIAGRAM



3.2 SENSORS

- **Temperature Sensor (Thermistor)**
  - This Thermistor is a resistor whose resistance is dependent on temperature here this change in resistence produces change in voltage, this voltage is taken as input to micro controller.
- **Keypad:**
  - Provides an interface to press a number which helps in controlling Fan,Light and Doors of our house.
- **Front Stop Switch(MicroSwitch):**
  - Stops the door automatically by pressing switch itself when door is completely opened.

- **Back Stop Switch(MicroSwitch):**
  - Stops the door automatically by pressing switch itself when door is completely opened.

3.3 ACTUATORS

- **LCD Display:**
  - Displays each and every value we enter in our keypad along with Temperature.
- **Light:**
  - Lightning inside the room is controlled by light.
- **Fan:**
  - Temperature inside room is controlled by fan.
- **Motor:**
  - Helps in opening and closing our doors.

3.4 MICRO CONTROLLER AND MEMORY

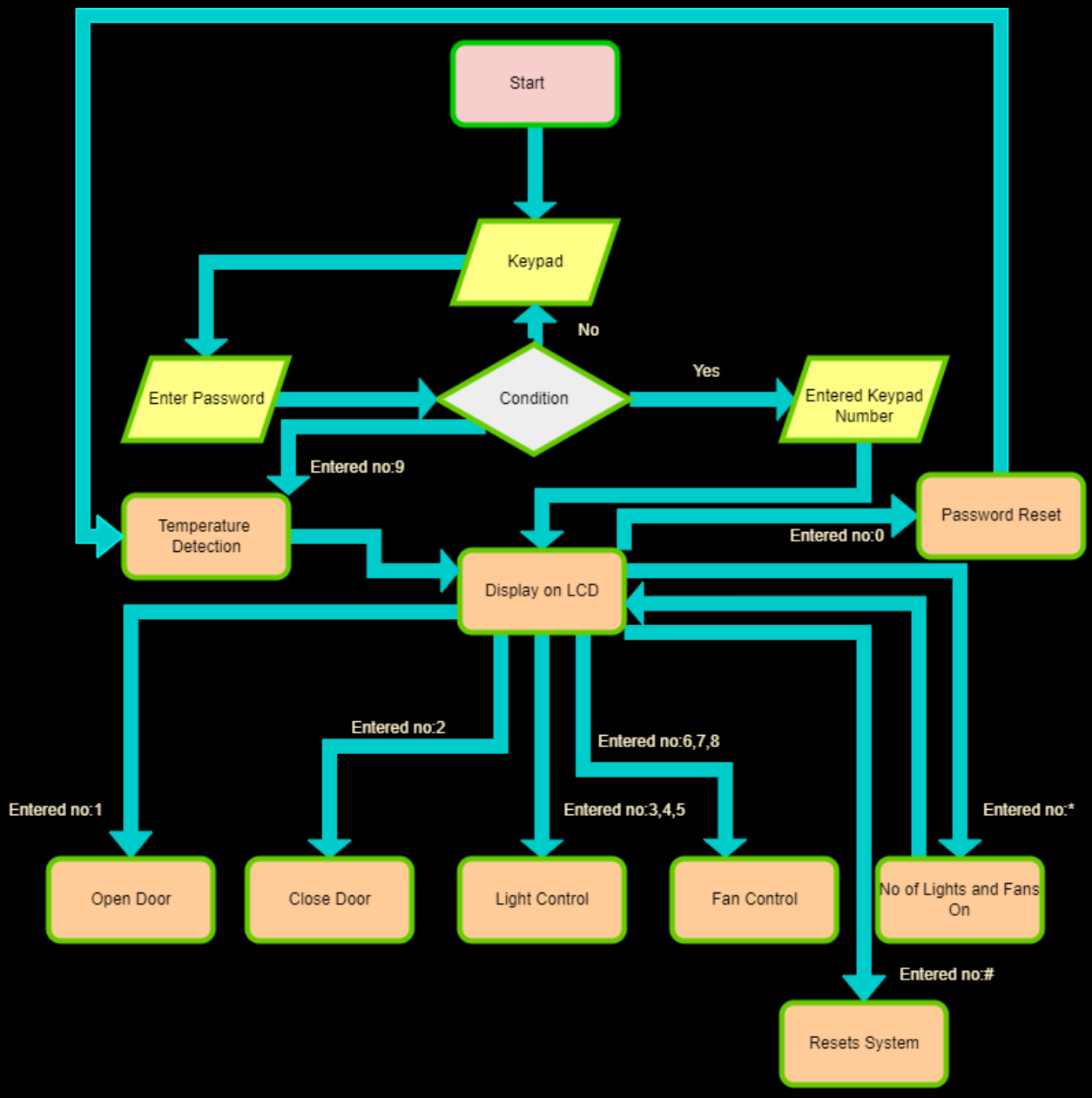
- **EEPROM**
  - Here this is actually inside the microcontroller
- **Clock**
  - Here we are using internal clock of our micro controller.
- **MicroController:**
  - This is the main component which controls all the above mentioned part or thins of our embedded system.This interfaces keypad and LCD and controlls the fan,light and doors depending on the value we pressed on keypad.

3.5 SUBSYSTEM & OTHERS

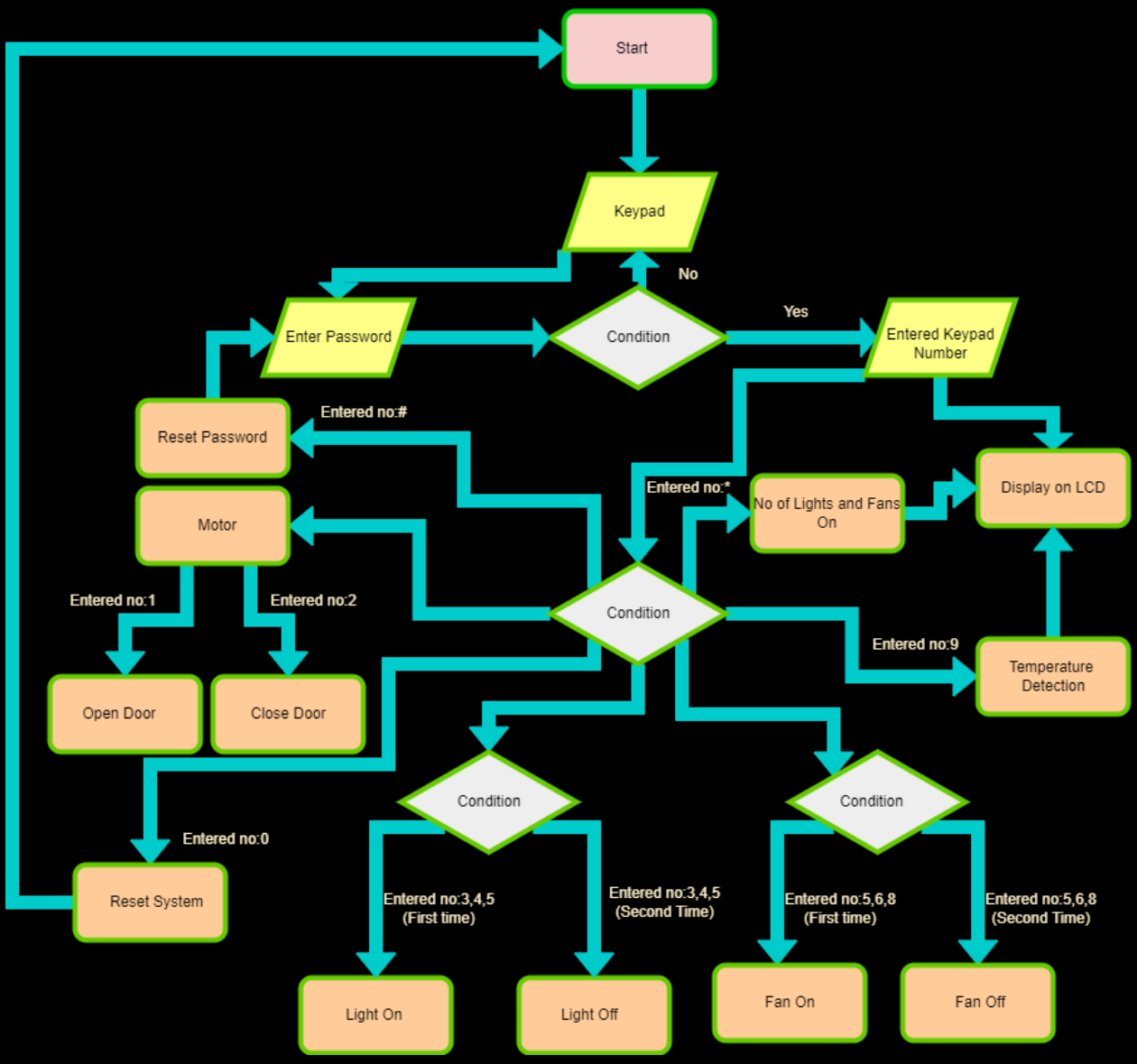
- **Motor Driver Unit:**
  - Helps in driving the motor for our door and fan by providing required power for them(we use motor driver L293).

4 Architecture

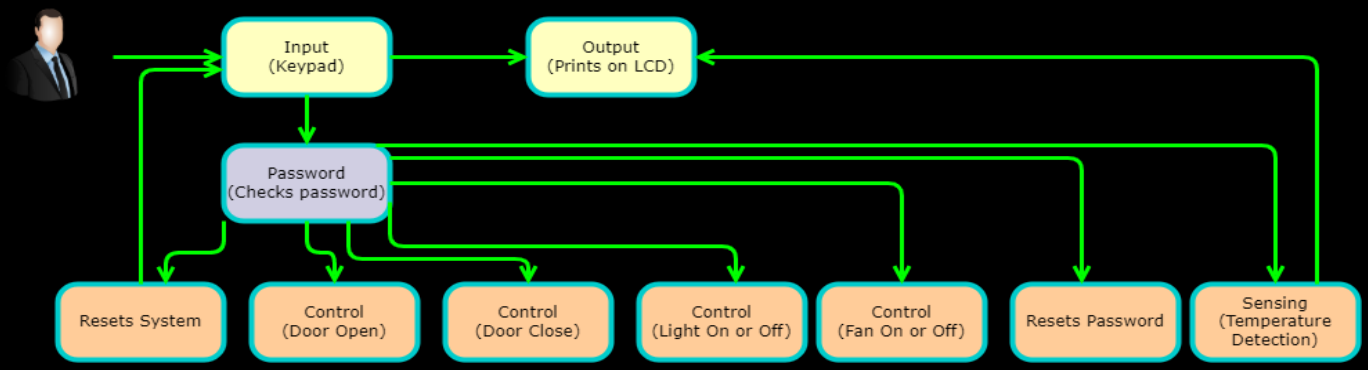
- ## 4.1 Behavioral Diagram
  - ### 4.1.1 High Level Flow chart Behavioural Diagram



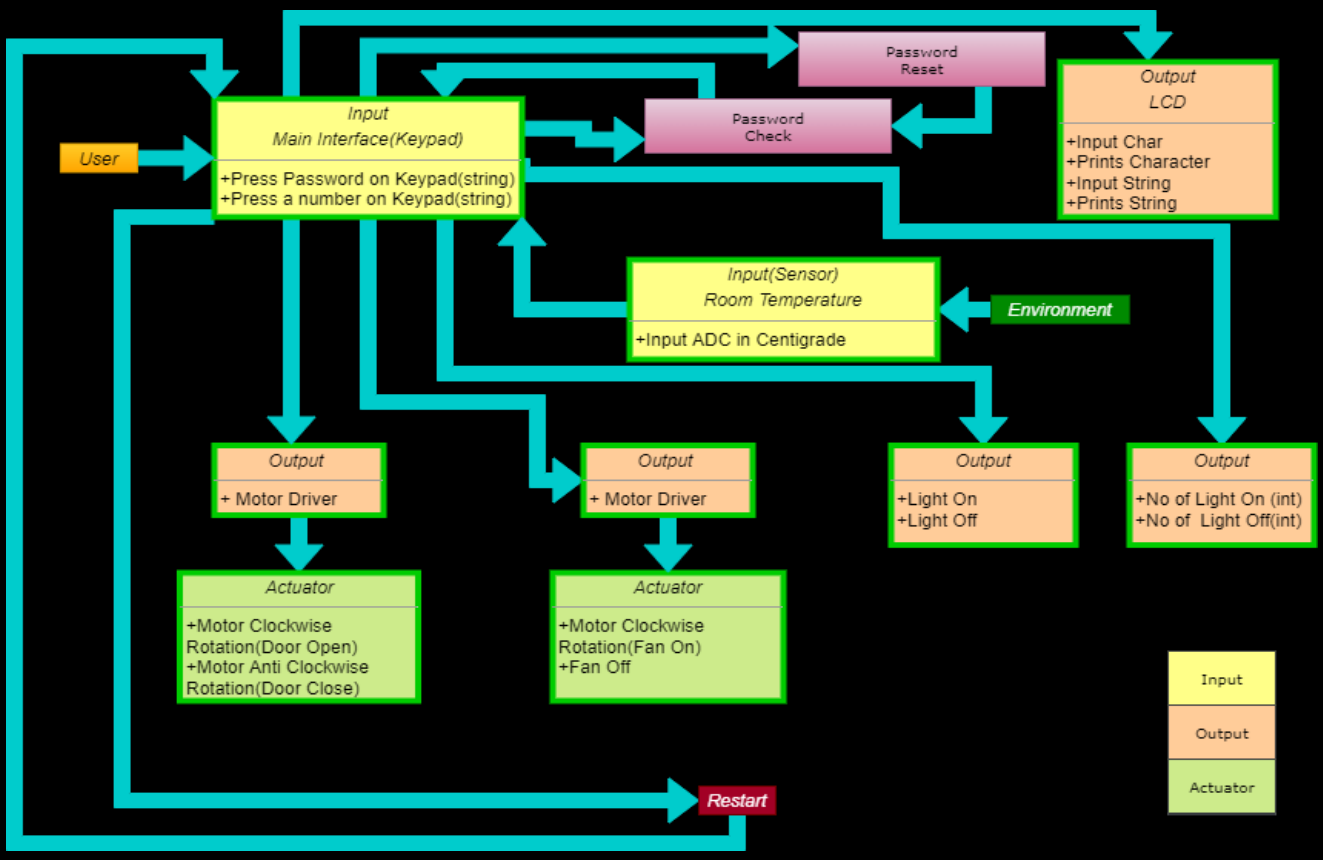
– 4.1.2 Low Level Flow chart Behavioural Diagram



- ## 4.2 Structural Diagram
  - ### 4.2.1 High Level UML Use Case Structural Diagram



  - ### 4.2.2 Low Level UML Use Case Structural Diagram



5 Test plan and output

5.1 HIGH LEVEL TEST PLAN

Test ID	Description	Input	Expected output	Actual Output	Passed Or Not
01	Thermistor	Room Temperature(25°C)	Temperature(25°C)	Temperature(25°C)	✓
01	Thermistor	Room Temperature(35°C)	Temperature(35°C)	Temperature(35°C)	✓
02	Keypad	1	1(Door Opens)	1(Door Opens)	✓
03	Keypad	2	2(Door Closes)	2(Door Closes)	✓
04	Keypad	3	3(Light on or off)	3(Light on or off)	✓
05	Keypad	4	4(Light on or off)	4(Light on or off)	✓
06	Keypad	5	5(Light on or off)	5(Light on or off)	✓
07	Keypad	6	6(Fan on or off)	6(Fan on or off)	✓
08	Keypad	7	7(Fan on or off)	7(Fan on or off)	✓
09	Keypad	8	8(Fan on or off)	8(Fan on or off)	✓
10	Keypad	9	Room Temperature Details	Room Temperature Displayed	✓
11	Keypad	*	* (No of Fan on and Light on)	* (No of Fan on and Light on)	✓
12	Keypad	0	0(Resets Password)	0(Resets Password)	✓
13	Keypad	#	# (Resets our system)	* (Restarted our system)	✓

Here below are the some of the *unity test/ unity framework* test plans there are so many but I have only mentiones some of the test cases here.

5.2 LOW LEVEL TEST PLAN

Test ID	Description	Input	Expected output	Actual Output	Passed Or Not
Test ID (for LCD)	Description	Input	Expected output	Actual Output	Passed or not
01	Check for LCD_Char()	A	A	A	✓
02	Check for LCD_String()	Manjunadh	Manjunadh	Manjunadh	✓
03	Check for LCD_String()	Home	Home	Home	✓
Test ID (for ADC)	Description	Input	Expected output	Actual Output	Passed or not
01	Check for ADC_Read()	0V	0	0	✓
02	Check for ADC_Read()	5V	1023	1023	✓
Test ID (for mapping, map	Description	Input	Expected output	Actual Output	Passed or not
01	Check for Map()	Map(20,492,478,20,35)	525	525	✓
02	Check for Map()	Map(25,492,478,20,35)	520	520	✓
03	Check for Map()	Map(30,492,478,20,35)	515	515	✓
04	Check for Map()	Map(35,492,478,20,35)	509	509	✓

6 Application

- This system can be used in Light Control of Houses, Industries, Stadiums etc.…
- This system can be used in Fan Control of Houses, Industries, Stadiums etc.…

- This system can be used in Door Control of Houses, Industries, Stadiums etc.…
- This system can be used in Automatic Temperature Detector of Houses, Industries, Stadiums etc.…
- This system can be used to know number of appliances “On” status of Houses, Industries, Stadiums etc.…

7 Assumptions

- Password is Preset as 1234 during manufacturing.
- RTD(Temperature Sensor) automatically takes input from environment and it reads from 20-35 degrees Centigrade.
- Front Stop and Back Stop switches(Digital Sensors) are assumed so that Main door Stops Automatically.

8 Output

9 Future Add On

- System starting with the same values at the point of stop
- Fan speed control with respect to Room Temperature
- Home Connectivity through Mobile

10 References

- https://www.electronicwings.com/explore